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THE UNIT OF STELLAR DISTANCE.

By Heber D. Curtis.

Elsewhere in this number of the *Publications* (in Abstracts from Astronomical Publications), Dr. Paddock gives a timely résumé of the various suggestions which have been put forward recently for a new unit of stellar distance. The suggested units are:

The andromede = distance of *Andromeda* nebula, 1,600 to 8,000 light-years.

Macron, parsec, astron, astrometer, siriometer = distance corresponding to a parallax of one second of arc = 3.26 light-years.

Siriusweite = distance corresponding to a parallax of $0''.2$ = 16.3 light-years.

Before any such unit is adopted, a general agreement among astronomers would be necessary, with full discussion of the needs for such a change, and this seems to be a favorable opportunity for the present writer to express his own personal disapproval of the units suggested.

The unit for the enormous distances needed in stellar studies should possess the following characteristics, or as many of them as possible:—

A. *It should depend upon concepts of space, time, and matter as fundamental, and as accurately known as present scientific knowledge permits.*

B. *It should be of such a nature as to be comprehended by the general reader, and by students with but elementary training.*

C. *It should be of such magnitude, preferably, that but rarely will statements involving the unit need to be expressed in numbers inconveniently large, or fractions inconveniently small.*

So completely does the customary and well-known unit of the light-year fill all these requirements, that any change appears to me not only to be entirely unnecessary, but even to savor a little of pedantry. To consider, in detail, the requirements outlined above:—

A. The velocity of light, from our present knowledge, appears to be as fundamental a constant in the world of matter as is e or π in mathematics; it is far more than merely the value of the velocity of light, as it expresses the relations between the electrostatic and electromagnetic units, and enters into many equations in pure physics. It is probable that we know its absolute value to-day at least within one ten-thousandth. As to the fundamental nature of our year and our day as a unit of time nothing need be said. The length of the *astron* depends upon the solar parallax; it is by no means certain that we know this latter constant with an error less than one thousandth. As to the *andromede,* will any one claim that we know the distance of the *Andromeda Nebula* within fifty per cent of its true value? Or the true distance of *Sirius* within five per cent? (SEELIGER'S *siriusweite* is the distance corresponding to a parallax of 0''.2; the modern values of the parallax of *Sirius* range from 0.''34 to 0''.40.) The length of certain waves of light has been adopted as the standard of length for the determination of the meter, and the velocity of light would appear to be an equally fundamental and fitting starting-point for our greatest standard of length.

B. The parallax of the fixed stars, as defined and used by astronomers, has no meaning whatever to the average layman, and the definition of an *astron* as such a distance that the mean radius of the Earth's orbit would subtend an angle of one second of arc, would be equally meaningless and carry with it no conception of the order of magnitude involved; the layman has forgotten, if he ever knew, just how small a quantity a second of arc is. He knows, however, that the speed of light is enormous, if he does not recall the exact figures, and the concept of the distance traveled by light in one year is easily grasped by him; his conception of the order of magnitude of a light-year is roughly correct, even though he may not know that this distance is nearly six trillion miles. The astronomer's convenience need not be considered; he will doubtless continue, as in the past, to use parallaxes expressed in seconds of arc in his studies and computations involving stellar distances. I can see no advantage from his standpoint in referring to the distance of a star as 14.3 *parsecs,* instead of saying that the star has a parallax of 0.07 seconds of arc; still less can I conceive that he would find it more convenient to say that the distance is 0.029 *andromede,* or 2.8 *siriusweiten,* rather than 46 light-years.

C. The light-year is a unit of convenient size when compared with the dimensions of the known stellar universe. Known stellar distances range from about four light-years to five hundred light-years, with uncertainties in the higher values, for the distances of *individual* stars, of from fifty to one hundred per cent. Beyond five hundred light-years we enter the domain of speculations, which, while of great interest and value, are still but speculations, founded upon more or less probable assumptions as to the absorption of light in space, conditions of surface luminosity, etc. Whether the Milky Way is three thousand, or several million light-years across, the light-year is still a usable unit. Should the advance of our knowledge ever bring it to pass that a larger unit is needed, the logical step would appear to be a decimal multiple of the light-year, the light-century, or the light-millenium.

PLANETARY PHENOMENA FOR SEPTEMBER AND OCTOBER, 1913.

By Malcolm McNeill.

PHASES OF THE MOON, PACIFIC TIME.

First Quarter..	Sept. 7, 5^h 6^m A.M.	First Quarter ..	Oct. 6, 5^h 46^m P.M.
Full Moon	" 15, 4 46 A.M.	Full Moon ...	" 14, 10 7 P.M.
Last Quarter ..	" 23, 4 30 A.M.	Last Quarter .	" 22, 2 53 P.M.
New Moon ...	" 29, 8 57 P.M.	New Moon ...	" 29, 6 29 A.M.

The fourth eclipse of the year, a total eclipse of the Moon, occurs on the night of September 14th-15th, the beginning visible generally in North American except the extreme northern portions, the Pacific Ocean, Australia, and eastern Asia; the ending visible generally in Alaska, the Pacific Ocean, except the eastern portions, Australia, and Asia.